III. REMARKS

1. Claims 1, 6, 12, 17, 24, and 29 have been amended and claims 26-27 and 31-32 have been cancelled, in order to expedite the prosecution of the application. New dependent claims 33-36 have been added. The amendments made to the claims are fully supported by the application as originally filed. In particular, support for the amendments made to claims 1 and 12 and new claims 33-36 can be found, for example, at page 9, line 1-page 8, line 21, page 9, line 14-page 10, line 8 of the original specification and Figs. 1 and 3; and support for the amendments made to claims 6 and 17 can be found, for example, in Figs. 1 and 3 and the corresponding description. No new matter has been introduced by way of the amendments made to the claims.

2. Claims 1 and 12 have been amended to overcome the 35 USC 112, second paragraph rejections.

The Examiner rejected claims 1-32 under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The Examiner has alleged that it is not clear if the stages of whitening are operating in series and if so, in which order. Claims 1 and 12 have been amended without reciting two different stages of whitening (i.e., spectral emphasis and decimation). Applicant respectfully requests reconsideration and withdrawal of the rejection.

3. Applicants respectfully submit that claims 1, 5-12 and 16-32 are patentable over the combination of Makino et al. (US 626760, "Makino") and Brennan et al. (US 6240192, "Brennan") under 35 USC 103(a).

The present application discloses, *inter alia*, a SAF system including an oversampled analysis filterbank for transforming a primary signal and a reference signal to frequency domain primary signals and frequency domain reference signals in a plurality of subbands, and a processor for processing the frequency domain signals in the subbands. The processor includes a module for operating on the frequency domain reference signal ***and*** the frequency domain primary signal to improve the convergence of each subband adaptive filter.

The Examiner has alleged that Makino discloses (1) whitening by decimation (col. 5, lines 15-35 of Makino), and (2) whitening by a whitening filter (spectral emphasis) stage (Fig. 16 of Makino), and thus Makino discloses the claimed whitening. Applicant disagrees with the Examiner.

The whitening by decimation in Makino is due to subband decomposition. *See* col. 5, lines 15-35 and col. 11, lines 25-37 of Makino. By contrast, according to claims 1 and 12, "whitening" is implemented after the subband decomposition and is implemented on the frequency domain primary signal *and* the frequency domain reference signal. Makino's whitening by decimation is therefore different from the limitation of "whitening" in claims 1 and 12.

With respect to the whitening filter of Makino, Applicant would like to draw the Examiner's attention to Figs. 7 and 16 of Makino. Fig. 7 of Makino shows a subband echo cancellation system. The echo cancellation system of Makino includes a subband analysis part 51 for outputting subband received signals, a subband analysis part 52 for outputting subband echo signals, an echo canceller 22, and an order determination control part 54. The echo canceller estimates an echo path vector, using the ESP algorithm with the order Pj determined by the order determination control part 54. *See* col. 11, lines 38-52, col. 12, lines 1-37, col. 15, lines 40-47, and Fig. 7 of Makino.

Fig. 16 of Makino shows the order determination control part 54 of Fig. 7. In the order determination control part 54, a whitening FIR filter 54Fj filters *the subband received signal xj(k)*. Makino adjusts the coefficients of the whitening FIR filter 54Fj *based on the subband received signals only*. *See* col. 15, lines 40-47, col. 18, lines 1-25 and Fig. 16 of Makino. Makino does *not whiten the subband echo signal*. Makino does not adjust the coefficients of the whitening FIR filter 54Fj based on the whitened subband received signal *and* the whitened subband echo signal.

Employing oversampled filterbank for subband adaptive filtering encounters a convergence problem due to oversampling (e.g., aliasing distortion, coloration of subband signals). The present application addresses, *inter alia*, the solution of this problem. According to the present application, the frequency domain reference signals ***and*** the frequency domain primary signals (oversampled subband signals) are whitened to adjust the coefficients of the subband adaptive filters, thereby increasing the convergence rate of the subband adaptive filters. Therefore, the inherent benefit of decreased spectral dynamics resulting from subband decomposition is not

lost due to oversampling. *See* page 6, the second paragraph of the original specification (Paragraph [0037] of the corresponding US Patent Application Publication). Makino does not use oversampled signals and thus is silent about the foregoing solution to the problem associated with the oversampling.

With respect to the rejection to claim 1, the Examiner has acknowledged that Makino does not specify producing and analyzing a primary and reference signal in order to produce the frequency domain signals; however the Examiner has alleged that Brennan discloses a primary signal (going into filter bank 26) and a reference signal (coming out of filter bank 26) to produce frequency domain signal. Furthermore, with respect to the rejections to claims 26 and 31, the Examiner has alleged that the echo canceller of Brennan acts to adapt filter coefficients to produce an echo estimate to be subtracted from the near-end signal.

Brennan discloses a system having an analysis filterbank 26, a synthesis filterbank 30, multipliers 28, and a programmable DSP 18. *See* Fig. 1 of Brennan.

Brennan states that "there is an analysis filterbank 26, that splits or divides the digital representation of the input signal or signals into a plurality of separate complex bands 1-N". *See* col. 3, lines 64-67. It is clear that the output from the filterbank 26 is a frequency domain signal. By contrast, according to claims 1 and 12, a primary signal and a reference signal are signals in a time domain, and thus at least the reference signal in the claims does not correspond to a signal "coming out of filterbank 26" of Brennan.

The multipliers 28 of Brennan are not adaptive filters. Brennan neither suggests nor teaches that the programmable DSP 18 includes an adaptive filter in each subband. Furthermore, Brennan does not disclose or suggest whitening frequency domain signals (after subband decomposition) to adjust the coefficients of adaptive filters.

Brennan is silent about adaptive filtering and whitening after subband decomposition. Brennan cannot add any teaching to Makino to render claim 1 unpatentable.

To establish prima facie obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art. In re Royka, 490 F.2d 981, 180 USPQ 580 (CCPA 1974). "All words in a claim must be considered in judging the patentability of that claim against the prior art." In re Wilson, 424 F.2d 1382, 1385, 165 USPQ 494, 496 (CCPA 1970). The Office has

not met its burden as at least the foregoing steps/elements of the claim are not taught or suggest by the prior art.

Applicants respectfully submit that the dependent claims are inventive at least by virtue of their dependencies and further distinguish the invention. The rejections to the claims are now moot and do not, therefore, need to be addressed individually at this time. It will be appreciated, however, that this should not be construed as Applicants acquiescing to any of the purported teachings or assertions made regarding the cited art or the pending application. For example:

According to present claim 21, the system includes an oversampled analysis filterbank, an oversampled synthesis filterbank *and* a processing module that includes a cross talk resistant adaptive processing module having a pair of adaptive filters in each subband. Similarly, according to claim 10, the processing step (not analyzing step or synthesizing step) performs a cross talk resistant adaptive processing using two adaptive filters in each band.

With respect to the rejections to claims 10 and 21, the Examiner has alleged that Brennan's subband method comprises two adaptive filters per subband (26, 30 in Fig. 1). However, the elements 26 and 30 in Fig. 1 of Brennan are an analysis filterbank and a synthesis filterbank respectively. Brennan does not disclose or suggest "two adaptive filters per subband" in its processing stage between the analysis filterbank 26 and the synthesis filterbank 30.

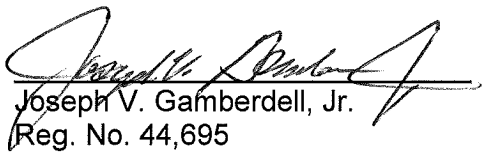
Therefore, the combination of Makino and Brennan fails to render claims 1, 5-12 and 16-32 unpatentable.

4. Claims 33-36 are new and depend from claim 1 and 12. As argued above, the combination of cited references fails to disclose or suggest all the features of claims 1 and 12 and therefore fails to render claims 33-36 unpatentable.

For all of the foregoing reasons, it is respectfully submitted that all of the claims now present in the application are clearly novel and patentable over the prior art of record, and are in proper form for allowance. Accordingly, favorable reconsideration and allowance is respectfully requested. Should any unresolved issues remain, the Examiner is invited to call Applicants' attorney at the telephone number indicated below.

The Commissioner is hereby authorized to charge payment for any fees associated with this communication or credit any over payment to Deposit Account No. 16-1350.

Respectfully submitted,



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